REPORT

OF

THE SECRETARY OF WAR,

IN ANSWER TO

A resolution of the 18th December, in relation to the removal of the raft in Red river, in Louisiana.

DECEMBER 29, 1845.

Read, referred to the Committee on Commerce, and ordered to be printed.

WAR DEPARTMENT, *December* 23, 1845.

SIR: In answer to a resolution of the Senate of the United States of the 18th instant, "directing the Secretary of War to inform the Senate to what extent the raft in Red river, in the State of Louisiana, has been removed under the contract made with Mr. —— Williamson, and whether any work is now being done to remove said raft; and, also, what further appropriation of money by Congress is necessary to the entire completion of said work," I respectfully transmit, herewith, a special report of the colonel of the corps of topographical engineers, which, together with that part of his annual report transmitted to Congress with the President's message at the commencement of the present session of Congress, page 359 to page 368, (see printed copy, also herewith enclosed,) contains all the information required by the resolution, so far as it can now be furnished by this department.

Very respectfully, your obedient servant,

W. L. MARCY,
Secretary of War.

GEORGE M. DALLAS,
Vice President of the United States,
and President of the Senate.

BUREAU TOPOGRAPHICAL ENGINEERS,
Washington, December 22, 1845.

SIR: The resolution of the Senate of the 18th instant, upon which I have been required to report, calls upon the "War Department to inform the Senate to what extent the raft in Red river, in the State of Louisiana, has been removed under the contract made with Mr. Williamson, and whether any work is now being done to remove said raft; and, also, what

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further appropriation of money by Congress is necessary to the entire completion of said work."

The resolution, it will be perceived, involves three inquiries, each of which will be specifically answered.

1st. In reference to the contract with Mr. Williamson. In the annual report from this office, of November, 1844, printed as Senate document No. 1 of the last session, a statement, in some detail, of operations under this contract, will be found. This statement shows that, on the 3d of March, 1841, an appropriation was made of $75,000 for the improvement of the Red river; that the War Department decided that the work should be done by contract; that proposals were invited, and the contract awarded to the lowest bidder (Mr. Thos. T. Williamson) on the 6th September, 1841. The terms of the contract required that the raft (embracing a distance of about three miles) should be removed, and the river be kept open, and in navigable order, for four years. $15,000 was the price stipulated for the removal of the raft, and the balance of the appropriation was to be devoted to keeping the river open during the four years; payments to be made in proportion to work done, under the direction of the superintending engineer, and upon his estimates of the value of the work.

The labor and cost of removing the raft far exceeded the estimate of the contractor, and the stipulated price of the contract. The work was done, however, within about three weeks of the time required by the contract; but the freshet of 1842 renewed the raft, and the work of its removal had to be done over again. In October, 1843, the superintending engineer reported that the work of that year had been unusually laborious and costly, in consequence of the constant accumulation of raft impediments. The aggregate of these impediments have been about four miles; but the river between the head of the raft and Shreveport was reported as in better condition than at any other time since the first removal of the raft. He speaks of the contractor as making every effort in his power; but also says it is very doubtful if the contractor will be able to comply with his contract for the remaining two years.

In his report of September, 1844, the superintending engineer (Captain Linnard) states that he had received a letter from the contractor, dated January, 1844, announcing his intention to abandon the work; and that he had, on the 6th of March, 1844, (the time of the semi-annual inspection,) declared the contract void.

From that time the work has been conducted under the superintending engineer, with the balance of the appropriation left after the contract had been declared void.

2d. Whether any work is now being done for the removal of said raft? It will probably be more satisfactory to answer this second inquiry, by reference to the work since the contract was abandoned.

At that time two miles of the raft had again accumulated, and it was estimated to contain about double the quantity of timber of any previous accumulation of the same length. The whole of this, except about 1,000 yards, was removed, when the work had to be suspended in consequence of the prevailing and general sickness of the party employed upon the work. Of these 1,000 yards, about 800 had been formed while the work of removal was going on; from which some idea may be acquired of the rapid accumulation of these impediments, and of the difficulties and expense of removing them.

The report of the superintending engineer, of October, 1845, was received too late for the annual report of last November, from this office, and therefore is not referred to in it. As this report embraces the last information from that quarter, the following extract is taken from it:

"In my letter of the 23d November, 1844, giving a brief history of the work performed after my assignment to this duty, I had the honor to inform you that about 1,000 yards of raft remained in the river; its entire removal having been prevented by sickness, which completely disabled the party employed, and rendered necessary its discharge on the 1st August.

"The autumn of 1844 was very dry, and the river was much later than usual in rising to a suitable stage for removing raft. In November, I employed a party to make a boom of cypress logs, and to saw the raft. The boom was complete in a few days and made fast to the right bank of the stream, and a powerful crab, with which to stretch it, was placed opposite. Every arrangement for throwing it across in a few minutes having been completed, the laborers were removed to the raft, which they finished sawing on the 15th of January.

"Deeming it most essential to the success of the operations for the melioration of the navigation that the boom should be thrown across the stream before the first run of drift, I stationed an assistant, with 15 men, at the point selected for it, with instructions to stretch it on the appearance of the first timber; and to employ his party until that time in making a good portage over the gorge of the bend, a distance of 206 yards. The detour in which the drift was to be received is about two and a half miles in circuit.

"On the 6th of February, the river having nearly reached a proper stage, and steadily rising, I repaired to New Orleans and engaged a steamboat and the necessary force to remove the raft.

"On the 18th, I began to pull the raft, a part of which had been loosened by a small boat which was pulling through it. On the 6th of March, the raft was all dislodged from its place of formation, which was in the broad river, above the contracted part, but was distributed between that point and Shreveport into several rafts, the aggregate of which amounted to about a mile and a half.

"The river continued to rise, and believing from its deepening color that the drift would soon make its appearance, I went in the steamboat to the boom, which I caused to be stretched on the 10th of March. During the night, after I had left, a defective iron gave way, and the boom parted.

"On the night of the 11th, the drift began to run, and formed a raft below the steamboat. At daylight 100 yards had accumulated. The amount of funds in my possession was only sufficient to enable me to clear the river of the old drift. My engagement with the owner of the steamboat required me to discharge her at Shreveport, which I could not have fulfilled if a large mass of new raft had formed below the boat. I therefore determined to force the boat through or over that which had already formed, without waiting to saw it. This was accomplished on the 12th with great difficulty and the loss of the rudder.

"On the 15th, the run of drift having ceased, I found the new raft did not exceed three hundred yards. I resolved to repair the boom and cause the late formation to be sawed. The boom was replaced on the 16th, and the sawing of the new raft finished on the 21st of March.

"It was my intention, on commencing the work, to thoroughly remove the drift from the stream and its banks, above Shreveport, and to leave it in such a condition, that (the boom arresting the timber above) no more work of the same kind would be required. The parting of the boom, and the necessity, consequent thereon, of sawing and forcing through sixty miles of narrow river the new formation of raft, obliged me reluctantly to abandon this object, and to endeavor to arrive at Shreveport on the 1st of March; by which time, it was calculated, the funds would be consumed. Accordingly, on that day the boat reached Shreveport, forcing nearly all the drift before her. Boat and hands were immediately discharged.

"Much assistance was derived from a number of river steamboats passing through the drift after it was first dislodged, in quest of the cotton produced above the raft.

"The citizens residing above the raft had become generally reconciled to the location of the boom below them. The interruption of the navigation, by a portage of two hundred yards, was not regarded as an evil of any magnitude, when compared with those that had been suffered for many years, from the annual formation of large rafts.

"The greatest objection arose from a fear lest the raft formed on the boom should back up the water, and overflow the banks. But this objection seemed to be removed by the assurance that a canal, or cut off, should be opened, below the boom, the moment it should be perceived that any injury would be likely to occur to the plantations above from back-water. I therefore entertained the hope that the boom would be suffered to remain, or even that the community would defend it against the attempts of evil-disposed persons, in view of the great advantages which its stability would have insured to them. This, however, has not been the case. The master of a transient boat, in an unnecessary and wanton manner, cut the boom, over which he might have passed his boat without difficulty. Upon sending to have it stretched again, some of the parts had been taken away, and the rest so much injured as to be unserviceable.

"The river continued open and in good navigable order, without any flood to set in motion the drift, until the 10th of May, when the timber began to run in great quantities, and continued until the 16th; during which time more than 3,000 yards of raft formed in the usual place.

"The freshets which may be expected before an appropriation will be granted, will increase the raft, by at least an equal amount; to remove the whole of which, will require $20,000. This sum would not have been needed if the boom had not been destroyed."

3d. In reference to future plans and appropriations. Upon these subjects, I beg leave, respectfully, to refer to the annual report and estimates submitted to Congress at the opening of the present session; a copy of which is herewith enclosed. The parts which speak of the Red river will be found in pages 359 to 368.

Respectfully, sir, your obedient servant,

J. J. ABERT,
Col. Corps Topographical Engineers.

Hon. W. L. MARCY,
Secretary of War.

Extract from the report of Col. Abert, chief of the corps of Topographical Engineers, to the Secretary of War, November 1, 1845.

RED RIVER.

The importance which this river has acquired since the annexation of Texas, gives to its improvement a highly national character, essential to the economy and success of military operations upon the frontier of that country; and no less essential to the development of its agricultural and mineral resources. This river enters the Mississippi about 56 miles below Natchez, from which point it pursues its sinuous course, slightly west of north, to the town of Fulton. A few miles above this town it turns suddenly to the west, and deviates but little from a western course to its source, crossing the 100th degree of longitude in about latitude 30° north. Throughout the greater part of its course it passes through an extremely rich country, well adapted to the cultivation of cotton, in which its production is already great, notwithstanding all the difficulties, dangers, and expense attending its navigation.

Three military posts have been established on this river: one, called Fort Jesup, about 190 miles from its mouth—that is, to the landing for this fort; the other, Fort Towson, about 390 miles higher up; the other, Fort Washita, about 130 miles further. These distances, estimated from the bends and circuitous course of the navigation, are probably somewhat exaggerated, and yet vastly below the estimated distances of the boatmen. The map of the office will not, however, justify the assumption of greater distances than those which have been stated. From these, then, it will appear that the highest post on the Red river (Fort Washita) is about 750 miles from the mouth of this river, or its entrance into the Mississippi. Now, as this post receives its supplies by the way of the river, the river is, therefore, navigable, with all its difficulties, during certain seasons, up to that point; and also higher for flat-bottomed boats.

The difficulties to the navigation are thus described by Capt. Linnard, of the corps:

"At some distant period, the Red river, which then probably received tribute *from* the Mississippi, and reached the gulf of Mexico through what is now the Atchafalaya, was a stream of broad channel, carrying a width of 600 feet more than a thousand miles from its mouth. The valley through which it takes its course is composed of deposites of very fine sand and alluvial substances, which are easily affected by the erosive action of the current. Changes in the direction of the channel sometimes take place with astonishing rapidity. The freshets of every year, abrading the banks, cause immense quantities of timber to fall into the stream; which, being dried by exposure to the sun during the summer, are taken up by the next flood, and carried down stream. Numerous snags must have lodged throughout the whole course of the river, at that period referred to; and it is quite probable that the formation of the first raft was caused by deposites of trees, at some point below Natchitoches, in sufficient number to arrest the drift timber brought down by subsequent freshets. A raft being once formed, the velocity of the current above it was diminished, and extensive deposites of the suspended soil were made on the bottom; decreasing the section of the channel until it became unequal to the discharge of all the water in full stages. The surplus, at such

times, rushed through the depressions in the natural banquette of the river; and, receiving an acceleration of velocity in descending the slopes towards the borders of the valley, cut deep channels to points below the obstruction, where it reunited with the main stream. The flood of each season added two or three miles to the raft, which, in the course of years, extended above the first, formed lateral channels, and compelled the water to make other detours around the obstacle. The whole bed of the river in which the raft had accumulated having become elevated above its original height, the lowest points of the valley became permanently inundated; the cypress swamps and oak flats on either side were converted into lakes, in which the trunks and stumps of trees still remain.

"The channel was contracted in breadth as well as depth. The deposites on its sides were no sooner exposed by the subsidence of the water, than a dense growth of willows and cotton-wood sprang up, which, checking the current of the next flood still more, caused more rapid deposites to be made.

"The timber at the foot of the raft gradually decaying, portions would occasionally break away; but the amount of annual increase greatly exceeded the quantity carried off; and when the government undertook the herculean work of removal, the foot of the raft had ascended to Loggy bayou, 100 miles above Natchitoches, while the head was at the Hurricane bluffs, 50 miles above Shreveport; the interval, comprising 160 miles, being filled with raft. The lower portion of the raft removed by Capt. Shreve must have lain more than half a century in the channel.

"As the raft was prolonged, the obstruction of the current became more complete, and the injury to the main channel proportionally greater, as we find the outlets increase in size and number, and the channel contract as we ascend.

"The effect of the raft has been, then—1. To raise the bed of the river, inundating much land that, previous to its existence, was above the reach of ordinary floods.

"2. To throw away large proportions of the water into lateral channels, and so to contract the width of the main channel throughout a distance of 200 miles, that the timber carried down by the floods cannot pass the surface breadth at numerous points, being less than the length of a single tree.

"Above the northern boundary of Louisiana no changes have been produced by the raft, except a slight elevation of the water, in consequence of the filling up of the channel at the head of the raft district. Descending the river from the Louisiana line, where its breadth is about 600 feet, the first outlet is Red bayou, 20 miles below the line. It communicates with Soda lake by an artificial canal, connecting it with Black bayou. During high water, when the banks of Red bayou are overflowed, and the river is obstructed by raft, the smaller boats can pass around it by this route, re-entering the river four miles above Shreveport; but it is always dangerous, owing to the stumps of trees in the lake and bayous, and can only be used during a short period in each year. The width of Red bayou near its head does not exceed thirty feet.

"The channel maintains its width for 18 miles below Red bayou to the Hurricane bluffs; below this point, which is the beginning of the raft district, in a distance of 7 miles, six outlets flow from the right bank into Soda lake, and the breadth of the channel is reduced to about 40 yards.

"At the Hurricane bluffs the river crosses the valley, touching the base of the western hills at Shreveport. About midway between these two points, Benoit's and Williams's bayous flow from the river into Bodeau lake, on the east. The first of these bayous was dammed by Captain Shreve, but did not remain closed. It now takes from the river about one-third of the water which passes the outlets into Soda lake.

"The Willow chute, formerly the principal eastern outlet above Shreveport, has filled up, in consequence of the bend out of which it flowed being cut off; it discharges very little water, except during high stages.

"At Shreveport the main channel receives again all its water, except what escapes through the three bayous last mentioned, and its breadth is suddenly increased.

"Three miles below, the outlets into bayou Pierre commence; and from that point to Loggy bayou, a distance of 100 miles, a great number of streams drain the waters to both sides of the valley. At Loggy bayou the water of the main channel is reduced to its minimum. Receiving through that bayou a portion of the water from lakes Bodeau and Bistineau, it begins to enlarge; 30 miles below, it receives another supply from lake Bistineau, through Coshatta chute; and 15 miles lower, bayou Nicolet completes this discharge of the two lakes.

"From Loggy bayou to Campté, 20 miles above Natchitoches, the river flows near the northeastern side of the valley, and the outlets are from the right bank into bayou Pierre. The most important are Grand bayou, 15 miles below Loggy bayou, and bayou Winsey, 5 miles below Coshatta chute. A considerable quantity of cotton is brought to the river from the bayou Pierre settlements, through Grand bayou, in keel and flat boats. Bayou Winsey is navigable for steamboats.

"At Campté, the river crosses the valley, which is here narrow, washing the western hills at Grand Ecore. Three miles above Grand Ecore, the confluence of bayou Pierre and the river takes place, and all the water of Red river is reunited in one channel. At their junction, the quantity discharged by bayou Pierre is more than double that passing through the main channel of the river.

"The entire distance from Grand Ecore to Phelps's bluff, estimated at 250 miles, has been filled with raft. The channel throughout the whole extent is sinuous. It is particularly so from Loggy bayou upwards, several of the detours measuring in circuit 4, 5, or 6 miles, having gorges not exceeding 300 yards.

"Willow bars have encroached upon the channel, the width of which, in many places, is too small to allow a large tree to pass."

I will here subjoin an extract from a report to General Gibson, by Lieutenant Northrop, which throws much light upon the present navigation of the river, and upon the mode of supplying the posts upon it.

"*Mode of supplying troops on Arkansas and Red rivers.*

"The inquiry concerning the plan of supplying the posts on the upper part of Red river is one of great range, and can only be answered by stating the difficulties which oppose themselves at the various points of the river, modified by the different seasons of the year; and then by explaining the general considerations which must enter, and the particular information concerning the state of the river, to be obtained in each case.

In fact, the conveying a certain knowledge of the river is the only reply to the general question.

"Red river presents two very different characters in its upper and lower portions, separated by that part which is the seat of the formations of the rafts. The upper river manifests all the features of a short stream, collecting from a wide expanse of country a great amount of water, therefore rising and falling with suddenness and rapidity; while, on the contrary, the lower river has the character of a very long stream, continuing steadily up after being once filled.

"Without reference to the primitive character of the river, the original formation of the raft, and its peculiar effects on the whole valley, it is enough here to state that the drift having been once stopped, each rise brings down all that the caving in of the banks, and other causes, have prepared. The raft extends up; the lower portion, by the pressure from above, after some years becomes water-soaked, sinks, and two consequences ensue: 1. The water being obstructed, and seeking outlets, opens large bayous. These carry off a great proportion of the river, leaving but a small sluggish stream in the original channel, which accommodates itself to it. When this water returns to its proper bed, it is of course widened proportionate to the amount restored.

"The other consequence is, that the sinking of the rafts also extends up, forming innumerable snags, planted in all directions and at every angle in the bed of the river. When the old raft was removed, these could not be got at, and in very low water render the navigation dangerous, and the narrow parts of the river almost impassable for boats of ordinary length, excepting cutting a way, as a road is opened through the fallen trees of a region over which a storm has passed.

"The first of these outlets is Red bayou, 25 miles above the lower Cushatte bluffs. From this point to the Hurricane bluffs there is a bend of 10 or 11 miles round, and a short 3 miles across. Within this distance are 12 outlets diverging from the right bank. Here it is that the drift usually stops.

"Within 20 miles down, two large water ways (Willow chute and Benoit's bayou) lead off to the lakes to the left. Between the latter and a point just above Shreveport, where the water which has escaped from the right bank returns, about 17 or 18 miles, the Red river is a mere ditch.

"The bayous overflow a great extent of country on each side, forming very large lakes, which every obstruction to the river has tended to increase and deepen; for, when a country is overflowed, the banks become higher.

"These lakes and reservoirs to feed the lower river hold to the upper the relation of a sea, into which the water collected from a country (wide but not distant from its destination) rapidly flows from many mouths, (the bayous,) to be gradually drained off the lower river. Hence arise the natural divisions of Red river: 1, the narrow sluggish part of about 45 miles from the bluffs to Shreveport, within which are the formations of the drift; 2, the river above; and 3, the river below.

"It is thus evident that, after the dry season, the lower river is not affected until enough of water has come from the upper to fill the lakes; and that, once full, it continues up until the next dry season.

"The water carried into the lakes from the right bank returns to the river just above Shreveport, by Caddo bayou, (or 12 mile bayou, as it is

usually called,) and furnishes a means of avoiding the raft, by going up it into the lakes, then through Black bayou into Red bayou, so re-entering the river above the raft, (as the whole of that portion where the formations of the drift occur is called.) Small steamers, carrying 6 or 800 barrels, make this passage.

"Should the accumulations of drift be cleared out this year as they were at the close of the last season, the next rise which furnishes sufficient water to run above brings drift before the first boat can pass through the raft-region; if she stops to pull it out, or waits until it is done, the water falls, and another rise is necessary to take her over the first shoals. Again, however well the drift may have been sawed and cut before being pulled, there are many long logs which could not be reached; these catch, and the raft re-forms. This may be done over and over again, until, reaching the broad river at Shreveport, the drift disperses. Should there be a rise from some other tributary before this occurs, another formation takes place above, and there are a series of rafts.

"These obstructions, which, if suffered to remain together during the boating season, could have been overcome by a single portage, are now extended into an obstacle which can only be passed by a small boat that can make the lake passage. The deductions to be drawn here are obvious.

"From this point up, the river is broad and beautiful, averaging 250 or 300 yards in breadth, with bars on either side extending across into shoals. The principal ones are, Little Prairie bar, 55 miles below Fulton; White Oak shoals, 40 miles above; Davis's shoals, 80 miles higher. The whole of the upper river is of a shoal character. The steamboat Miami lay three weeks waiting for water (with provisions in December last) within 25 miles of Fort Towson.

"The position of those tributary streams which cause high water in Red river, also forms an element of consideration. The first is Sulphur fork, 60 miles above the raft, a southern or western branch; the next, in ascending, is Little river, 3 miles above Fulton. Kiamichia, Boggy, Blue, and Washita on the north, and Wichitta on the south, are all above Fort Towson.

"At Fulton, it is at once known when Little river is up; if not, and Red river is rising, then the water comes from above Fort Towson. Hence, it is only at this place that any reasonable calculations can be made as to the practicability of going up.

"It is 260 miles to Fort Towson, and six or eight days are consumed in delivering freight there and returning, while Red river rises and falls from ten inches to near two feet per hour; therefore, boats which are unwilling to be caught above will not proceed from Fulton, unless while the river is rising fast. The steamer Fort Towson, destined for the fort, reached Fulton while the river was slowly rising; she therefore prepared the next morning to return;—in a few hours the rise became more rapid;—she took in freight and went up.

"The probability is, that some boat will be caught in the upper river at the approach of the dry season; if not, it is certain that some small boats will go through the lakes, or upon the earliest rise, and pull through the first formation of drift, which can generally be done; the inducement is, the higher freight on the upper river.

"During the boating season the bringing down of cotton is the chief business—the up loads secondary; therefore quick trips are important,

and time peculiarly valuable on this stream; and, consequently, no merchant boat will take freight without the privilege of storing and reshipping. Yet it is a great object to ascend as high as they can, for the price of bringing down cotton increases much more rapidly than the distance; this is a security against their returning before a sound prudence requires it.

"The first rise after the dry season brings down not merely the drift, which stops the navigation, but the boats which have been delayed above; so that not only can the raft be avoided, by a convenient portage at the bluffs, but freight generally goes on at once after reshipping; hence the importance of getting up stores before the raft has been scattered, or rather divided. Again; it is important to get them to Fulton and prevent their being stored below, for it is only there that any reasonable conjecture can be formed as to the practicability of a boat getting up; so that, in reshipping from the raft, no storage should be permitted before reaching that point;—this boats will consent to, for at the raft it can be known if they can get up to Fulton.

"Hence, in shipping from New Orleans, storing and reshipping at the raft and at Fulton must, in ordinary cases, be permitted. From thence boats are anxious to get up in the neighborhood of Fort Towson, where the freight for cotton is very high; and, if possible, they will attempt it, and apply for any public freight, which is preferable to private. The boats usually settle down into particular branches of the trade, and have a reputation to sustain for the fulfilment of their engagements.

"Should the shipper in New Orleans have a load sufficient to *fill* a boat of from seven to eight hundred barrels, or even more, whose expenses are low, and her draught light, she will give bills of lading clear through, wait on the water, put up on every rise, (however small,) deliver the stores in the shortest time, and yet make a profit. But no boat will take anything *less* than a load on such terms, unless with an increased price; which, in some cases, it might be policy to allow.

"The boating season is from the latter part of November until June; but all the public supplies should be on the river in March, for last season the water fell in May, and no rise, sufficient to run to Fort Towson, occurred until December. The seasons, and the state of the river, should have much weight in determining the character of the boat; and, at the close of the season, 50 cents more per barrel would be profitably paid to one boat in preference to another.

"If it were necessary to collect a large quantity of supplies at Fort Towson, any amount could be soon stored at the raft; one or more small steamboats should be procured, and provided with keel boats, which they could tow and lighten over the shoals with, and, if a rise happened, drop them and push up. With such a conjunction, this operation could be carried on until August—perhaps all the year. And when the steamer could not run, strong crews, drawn from the post, could operate with the keels.

"Just above Alexandria there are a series of falls and rapids, of one and a half miles in length; in low water they are exposed and impassable to steamboats; this is 140 miles above the mouth of Red river.

"From New Orleans to Alexandria, it is 360 miles.

"To Grand Ecore, it is - - - 95 miles higher.

"To Shreveport, it is - - - 110 miles higher.
" Fulton, it is - - - 120 " "
" Fort Towson, it is - - 160 " "
" Fort Washita, it is - - 170 " "

"The distances I believe to be correct, though it is usually called 250 miles from Grand Ecore to Shreveport; the same from thence to Fulton, and 300 miles to Fort Towson. These estimates are based on the number of points from shore to shore, averaging the distance between them at two miles, which is evidently too much, though kept up by the boatmen generally."

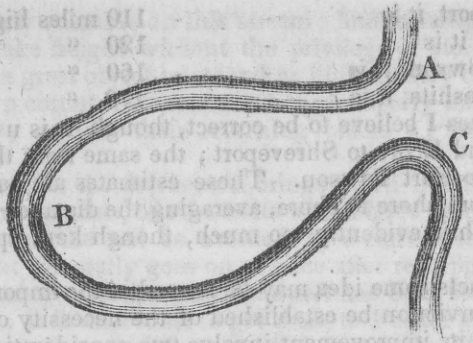
From these facts some idea may be formed of the importance of this river, and some conviction be established of the necessity of improving it.

The plans for its improvement involve two considerations: 1st, the removal of rafts, snags, logs, and impending trees; 2d, the making of several "cuts off."

Of the first there can be no doubt;—the river must be cleared of rafts, snags, logs, and impending trees, hanging over the streams, liable to fall in, and frequently falling in. This is a first process—costly, but absolutely essential; as, until that be done, and the river be kept clear of such obstacles, all other operations become, in a measure, useless. Moreover, this should be done, and the river be kept clear for some time before other modes of improvement can be judiciously planned or commenced; as other plans must depend upon the action and course of the river, and upon their effects as manifested by the action of the stream, in its passing through an unimpeded bed, during a sufficient period. Work of this kind cannot be done by contract. He who has sufficient means will not hazard them in so precarious and costly an undertaking; and he who has not, is of course unable to accomplish any thing. Such work can only be done by government, with its own means, and under well-selected superintendents.

It is not merely necessary to remove these obstructions from the river, but it is essential that the materials of which they are composed should be either destroyed or transported beyond the reach of the river floods; otherwise they are brought back again into the bed of the river, and have again to be removed. These rafts are not the accumulation of fresh timber on every flood. It is easy to prove that no country in the world could furnish such supplies of timber annually. They are chiefly the re-formation of timber once removed, but left within the reach of succeeding floods. It is clear, therefore, that if the materials of these rafts were destroyed, or placed beyond the action of every subsequent flood, the river would in time be free, and be easily relieved of any future formations.

The second consideration—"cuts off"—is of very doubtful utility, and more generally productive of pernicious than of advantageous consequences. The advocates of this system look too exclusively to a saving of distance, without making the reflection that in the attempt to save distance the navigation of the river may be seriously and irremediably injured. I am satisfied that the system has been injurious to the Mississippi, and that the water which could be carried to St. Louis, before any "cuts off" were made in that river, was greater there than it is now. It is a sacrifice of the general navigation of the river to a temporary convenience, or to a limited and local benefit. I will further illustrate my ideas on this subject by the following diagram:



We will suppose the distance from A to C, by the bend B, to be 20 miles; that the river has in this distance a fall which we will suppose to be 2 feet. We will also suppose the direct distance from A to C to be a quarter of a mile. Now the "cut-off" system would recommend an opening to be made direct from A to C, and the passage of 20 miles around the bend be thereby reduced to a quarter of a mile. But let us examine into consequences. The waters at A, while the bend existed, were drawn off or passed off by a current of no greater velocity than could be created by a fall of 2 feet in 20 miles. But the "cut off" being made, the water at A is now drawn off with a velocity due to a fall of 2 feet in a quarter of a mile; and, as a consequence, the river above A is soon drained, and rendered innavigable. We will say nothing of the difficulties occasioned to the ascending trade by the rapid current of the "cut off" increasing so seriously the time of making a passage; known to be so great on the Mississippi as to give but little advantage to the saving of distance. The tardy manner with which the water at A was drawn off, while the bend existed, would probably preserve a full river above the point for many weeks, or even for months, as subsequent floods brought additional supplies; but the rapid drawing off occasioned by the "cut off" would probably bring the river down in a few days, and reduce the navigation above the point A to a mere temporary navigation during periods of flood. Bends increase the length of a river; by increasing the length they reduce the fall in proportion to the water-way. By reducing the fall the river is longer in discharging its floods, and maintains a depth for navigation so much the longer. The longer the bend, in proportion to the "cut off," the more pernicious the effects of the "cut off;" and yet such are places most eagerly seized upon for experiments of this kind.

Another evil effect of these cuts off is, that the rapid draining of water from above floods regions below, which before were dry and cultivated.

It is possible that there may be places where cuts off would be of some advantage: but, properly to decide upon them will require previous investigations, not merely of the peculiar character of the locality of the cut off, and of the difference of level involved, but there should also be a careful study of the peculiarities of the river for a considerable distance both above and below.

But, as before remarked, these are considerations which, together with any operation upon shoals and bars, belong to a subsequent period. Our first efforts must be directed to the removal of rafts, snags, and logs, and other obstructions of that kind in the channel way.

There are, moreover, connected with this river numerous navigable tributaries and bayous—all of which, as well as the main river, are more or less obstructed by rafts, snags, logs, &c., which require to be removed. Operations for the improvement of this stream may be prosecuted through nearly the whole year, as far as climate and the action of freshets are involved; but time required for the repair of machinery and boats, and more especially to the health of those employed upon the work, will occasion an intermission of labor upon the river during about four months of the year, which would leave eight months for the time of actual operations upon obstructions during a year.

Two steamboats should be constructed, adequate to act efficiently upon the obstructions, and two of the kind of boats known in the operations upon the Mississippi as steam machine-boats.

The cost of these, and the expense of keeping them in employ during eight months, is as follows:

Cost of the construction of 1 steam snag and raft boat - -	$25,000
Cost of one machine-boat - - - - - -	12,000
	$37,000
Cost of 2 of each - - - - - -	$74,000
Cost of working 1 snag-boat, including compensation for officers and hands for 1 month - - - - -	2,200
Cost of working 1 machine-boat, including compensation for officers and hands for 1 month - - - -	1,200
Cost of 2 of each for 1 month - - - - -	6,800
Cost of 2 of each for 8 months - - - - -	54,400
Aggregate cost of boats, and cost of working the same during 8 months - - - - - - -	128,400
One civil agent per year - - - - -	1,500
Contingencies, preservation and repairs, &c., for 1 year -	5,500
Total - - - -	$135,400

But for the ensuing fiscal year the amount of $80,000 will be required.

The necessity of removing the raft and snag timber beyond the reach of freshets, or of destroying it, will unavoidably increase the cost of work on this river, and render an accurate estimate extremely difficult to make until after experience has thrown its desirable light upon the process. The boats will require more hands than merely for removing snags. Also, means will have to be provided for removing the raft timber out of the way, and for destroying it, which may oblige a modification of the equipment from that stated in the estimate. These matters must be left to the discretion of the engineer in charge of the work, under the supervisory power of the bureau in seeing that all expenditures are properly accounted for, and are appropriate in reference to the intention of the appropriation in the accomplishment of its object.